

## Appendix E

### SUMMARY OF AIR QUALITY IMPACT ANALYSIS FOR THE CONTRA COSTA POWER PLANT UNIT 8 PROJECT

September 2, 2000

#### BACKGROUND

Southern Energy Delta LLC has submitted a permit application (# 1000) for a proposed 530-MW combined cycle power plant, the Contra Costa Unit 8. The new unit will include two natural gas-fired turbine generators, two supplementally fired heat recovery steam generators, a fuel gas preheater, and a cooling tower. The proposed project will result in an increase in air pollutant emissions of NO<sub>2</sub>, CO, PM<sub>10</sub> and SO<sub>2</sub>, triggering regulatory requirements for an air quality impact analysis.

#### AIR QUALITY IMPACT ANALYSIS REQUIREMENTS

Requirements for air quality impact analysis are given in the District's New Source Review (NSR) Rule: Regulation 2, Rule 2.

The criteria pollutant annual worst case emission increases for the Project are listed in Table E-1, along with the corresponding significant emission rates for air quality impact analysis.

Table E-1  
Comparison of proposed project's annual worst case emissions  
to significant emission rates for air quality impact analysis

Pollutant	Proposed Project's Emissions (tons/year)	Significant Emission Rate (tons/year) (Reg-2-2-304 to 2-2-306)	EPA PSD Significant Emission Rates for major stationary sources
NO <sub>x</sub>	174.3	100	40
CO	259.1	100	100
PM <sub>10</sub>	112.2	100	15
SO <sub>2</sub>	48.5	100	40

Table E-1 indicates that the proposed project emissions exceed the significant emission levels for nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), and respirable particulate matter (PM<sub>10</sub>). The source is classified as a major stationary source as defined under the Federal Clean Air Act. Therefore, the air quality impact must be investigated for all pollutants emitted in quantities larger than the EPA PSD significant emission rates (shown in the last column in Table E-1). Table E-1 shows that the NO<sub>2</sub>, CO, PM<sub>10</sub>, and SO<sub>2</sub> ambient impacts from the project must be modeled. The detailed requirements for an air quality impact analysis for these pollutants are

given in Sections 304, 305 and 306 of the District's NSR Rule and 40 CFR 51.166 of the Code of Federal Regulations.

The District's NSR Rule also contains requirements for certain additional impact analyses associated with air pollutant emissions. An applicant for a permit that requires an air quality impact analysis must also, according to Section 417 of the NSR Rule, provide an analysis of the impact of the source and source-related growth on visibility, soils and vegetation.

## **AIR QUALITY IMPACT ANALYSIS SUMMARY**

The required contents of an air quality impact analysis are specified in Section 414 of Regulation 2 Rule 2. According to subsection 414.1, if the maximum air quality impacts of a new or modified stationary source do not exceed significance levels for air quality impacts, as defined in Section 2-2-233, no further analysis is required. (Consistent with EPA regulations, it is assumed that emission increases will not interfere with the attainment or maintenance of AAQS, or cause an exceedance of a PSD increment if the resulting maximum air quality impacts are less than specified significance levels). If the maximum impact for a particular pollutant is predicted to exceed the significance impact level, a full impact analysis is required involving estimation of background pollutant concentrations and, if applicable, a PSD increment consumption analysis.

### ***Air Quality Modeling Methodology***

Maximum ambient concentrations of NO<sub>2</sub>, CO, PM<sub>10</sub> and SO<sub>2</sub> were estimated for various plume dispersion scenarios using established modeling procedures. The plume dispersion scenarios addressed include simple terrain impacts (for receptors located below stack height), complex terrain impacts (for receptors located at or above stack height), impacts due to building downwash, impacts due to inversion breakup fumigation, and impacts due to shoreline fumigation.

Emissions from the turbines will be exhausted from two 195 foot exhaust stacks. The project also includes emissions from a fuel gas preheater with a release height of 26 feet and a cooling tower (comprised of 10 cells) with a release height of 60 feet. Table E-2 contains the emission rates used in each of the modeling scenarios: turbine commissioning, maximum 1-hour (which includes start-up), maximum 3-hour, maximum 8-hour, maximum 24-hour, and maximum annual average. Commissioning is the original startup of the turbines and only occurs during the initial operation of the equipment after installation.

The applicant used the EPA models SCREEN3 and ISCST3. A land use analysis showed that the rural dispersion coefficients were required for the analysis. The models were run using five years of meteorological data (1994 through 1998) collected at the existing Contra Costa Power Plant less than one-half of a mile from the proposed project site. Because the exhaust stacks are less than Good Engineering Practice (GEP) stack height, ambient impacts due to building downwash were evaluated. Because complex terrain was located nearby, complex terrain impacts were considered. Both inversion breakup and shoreline fumigation were evaluated using the SCREEN3 model. The Ozone Limiting Method was used to convert one-hour NO<sub>x</sub> impacts

into one-hour NO<sub>2</sub> impacts. The Ambient Ratio Methodology (with a default NO<sub>2</sub>/NO<sub>x</sub> ratio of 0.75) was used for determining the annual-averaged NO<sub>2</sub> concentrations.

Table E-2  
Averaging period emission rates used in modeling analysis (g/s)

Pollutant Source	Max (1-hour)	Commissioning <sup>1</sup> (1-hour)	Maximum (3-hour)	Maximum (8-hour)	Maximum (24-hour)	Maximum Annual Average
NO <sub>x</sub>						
Turbine 1	21.4	21.4	n/a	n/a	n/a	2.72
Turbine 2	2.48	24.8				2.72
Fuel Gas Preheater	0.0571	0.0571				0.00130
Cooling Tower	—	—				—
CO						
Turbine 1	69.0	69.0	n/a	18.3	n/a	n/a
Turbine 2	3.62	36.2		2.00		
Fuel Gas Preheater	0.0195	0.0195		0.0195		
Cooling Tower	—	—		—		
SO <sub>2</sub>						
Turbine 1	0.780	0.780	0.780	n/a	0.780	0.780
Turbine 2	0.780	0.780	0.780		0.780	0.780
Fuel Gas Preheater	0.00416	0.00416	0.00416		0.00416	0.00416
Cooling Tower	—	—	—		—	—
PM <sub>10</sub>						
Turbine 1	n/a	n/a	n/a	n/a	1.39	1.51
Turbine 2					1.39	1.51
Fuel Gas Preheater					0.0112	0.000260
Cooling Tower					0.224	0.215

<sup>1</sup>Commissioning is the original startup of the turbines and only occurs during the initial operation of the equipment after installation.

### ***Air Quality Modeling Results***

The maximum predicted ambient impacts of the various modeling procedures described above are summarized in Table E-3 for the averaging periods for which AAQS and PSD increments have been set. Shown in Figure E-1 are the locations of the maximum modeled impacts.

Also shown in Table E-3 are the corresponding significant ambient impact levels listed in Section 233 of the District's NSR Rule. In accordance with Regulation 2-2-414 further analysis is required only for the those pollutants for which the modeled impact is above the significant air quality impact level. Table E-3 shows that the only impact requiring further analysis is the 1-hour NO<sub>2</sub> modeled impacts.

TABLE E-3  
Maximum predicted ambient impacts of proposed project ( $\mu\text{g}/\text{m}^3$ )  
[maximums are in bold type]

Pollutant	Averaging Time	Commissioning Maximum Impact	Break-up Fumigation Impact	Shoreline Fumigation Impact	ISCST3 Modeled Impact	Significant Air Quality Impact Level
NO <sub>2</sub>	1-hour annual	93.2 n/a	34.1 n/a	<b>225.2</b> n/a	93.2 <b>0.23</b>	19 1.0
CO	1-hour 8-hour	218 43.7	202 37.5	<b>1335</b> <b>248</b>	186 24.2	2000 500
SO <sub>2</sub>	1-hour 3-hour 24-hour annual	15.7 6.36 1.70 n/a	2.28 2.05 0.91 n/a	15.1 <b>13.6</b> <b>1.89</b> n/a	<b>15.7</b> 6.36 1.70 <b>0.40</b>	n/a 25 5 1.0
PM <sub>10</sub>	24-hour annual	4.59 n/a	4.05 n/a	4.22 n/a	<b>4.59</b> <b>0.22</b>	5 1

### *Background Air Quality Levels*

Regulation 2-2-111 entitled “Exemption, PSD Monitoring,” exempts an applicant from the requirement of monitoring background concentrations in the impact area (section 414.3) provided the impacts from the proposed project are less than specified levels. Table E-4 lists the applicable exemption standard and the maximum impact from the proposed facility. As shown, all modeled impacts are below the preconstruction monitoring threshold.

TABLE E-4  
PSD monitoring exemption levels and maximum impacts  
from the proposed project for NO<sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )

Pollutant	Averaging Time	Exemption Level	Maximum Impacts from Proposed Project
NO <sub>2</sub>	annual	14	0.22

The District-operated Pittsburgh 10<sup>th</sup> Street Monitoring Station was chosen as representative of the background NO<sub>2</sub> concentrations. Table E-5 contains the concentrations measured at the station over the past 5 years (1995 through 1999).

TABLE E-5  
Background NO<sub>2</sub> (µg/m<sup>3</sup>) at Pittsburg 10<sup>th</sup> Street Monitoring  
Station for the past five years (maximum is in bold type)

Year	NO <sub>2</sub>
	Highest 1-hour average
1995	143
1996	133
1997	132
1998	120
1999	<b>164</b>

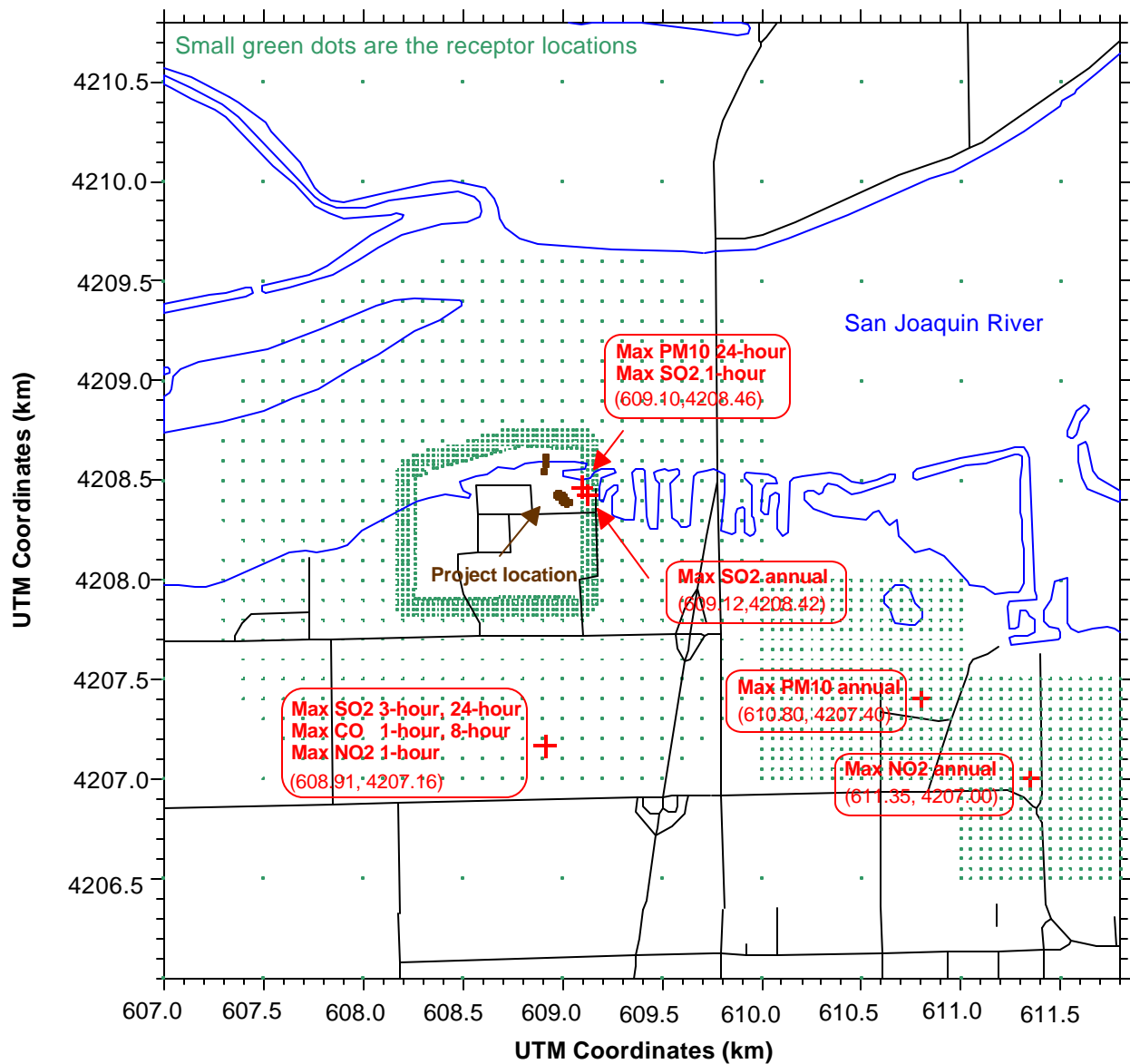


Figure E-1. Location of project maximum impacts.

Table E-6 below contains the comparison of the ambient standards with the proposed project impacts added to the maximum background concentrations. The California ambient NO<sub>2</sub> standard is not exceeded from the proposed project. Therefore, in accordance with Regulation 2-2-414, only a visibility, soils and vegetation impact analysis is further required.

TABLE E-6  
California and national ambient air quality standards and  
ambient air quality levels from the proposed (µg/m<sup>3</sup>)

Pollutant	Averaging Time	Maximum Background	Maximum Project Impact	Maximum Project impact plus maximum background	California Standards	National Standards
NO <sub>2</sub>	1-hour	164	225	389	470	---

## VISIBILITY, SOILS AND VEGETATION IMPACT ANALYSIS

Visibility impacts were assessed using EPA's VISCREEN visibility screening model. The analysis shows that the proposed project will not cause any impairment of visibility at Point Reyes National Seashore, the closest Class I area.

The project maximum one-hour average NO<sub>2</sub>, including background, is 389 µg/m<sup>3</sup>. This concentration is below the California one-hour average NO<sub>2</sub> standard of 470 µg/m<sup>3</sup>. Crop damage from NO<sub>2</sub> requires exposure to concentrations higher than 470 µg/m<sup>3</sup> for periods longer than one hour.

Maximum project NO<sub>2</sub>, CO, SO<sub>2</sub>, and PM<sub>10</sub> concentrations would be less than all of the applicable State and national primary and secondary ambient air quality standards, which are designed to protect the public welfare from any known or anticipated effects, including plant damage. Therefore, the facility's impact on soils and vegetation would be insignificant.

## CONCLUSIONS

The results of the air quality impact analysis indicate that the proposed project would not interfere with the attainment or maintenance of applicable AAQS for NO<sub>2</sub>, CO, SO<sub>2</sub>, and PM<sub>10</sub>. The applicant's analysis was based on EPA approved models and calculation procedures and was performed in accordance with Section 414 of the District's NSR Rule.